

REMARKS/ARGUMENTS

This responds to the Office Action dated 22 September 2003.

Request for Reconsideration

Applicant respectfully requests reconsideration of the application in view of the following remarks and arguments. The pending claims are claims 7, 11, 12, 14, and 16-25. Claims 19-23 correspond to previous claims 2-6. Claims 24-25 correspond to previous claims 9-10.

Rejection of claims 7, 11, 12, 14, 17, and 18 over Woodhead et al. in view of Okulov

Claims 7, 11, 12, 14, 17, and 18 are rejected over Woodhead et al. in view of Okulov. The Examiner states that:

Woodhead et al. discloses an oscillator to provide a square wave voltage signal and a transmission line having an input and an output and a phase detector detecting a phase difference between the square wave voltage provided by the oscillator and the transmission line and the phase detector providing an output signal indicative of the phase difference caused by changes in moisture content of a medium surrounding the transmission line (Columns 2-5). What is not specifically disclosed by Woodhead et al. is a semiconductor circuit being indicative of a logical exclusive OR function of signals applied to the first and second inputs of the circuit. However, Okulov disclosed in "Water level alarm"

Applicant disagrees with the Examiner's claim rejections under 35 U.S.C. § 103 over Woodhead et al., Kaufman, Okulov, Numoto, and Rauchwerger in various combinations. As explained in an earlier response, the Examiner has a fundamental misunderstanding of basic wave theory as it applies to phase that continues to go

uncorrected. The Examiner states that “Woodhead et al. discloses an oscillator to provide a square wave voltage signal and a transmission line having an input and an output and a phase detector detecting a phase difference between the square wave voltage provided by the oscillator and the transmission line and the phase detector providing an output signal indicative of the phase difference caused by changes in moisture content of a medium surrounding the transmission line (Columns 2-5.)”

While the Examiner generically references “Columns 2-5,” again there is no specific support for the allegation that Woodhead et al. discloses a *phase detector*. The Applicant again implores the Examiner to specifically recite the column and line from Woodhead et al. disclosing what the Examiner believes is a “phase detector.” Neither of the terms “phase” or “detector” even occur in Woodhead et al. The Examiner has not satisfied the most basic burden of showing a “phase detector” with any degree of certainty to properly support a § 103 rejection. The Applicant believes that the reason the Examiner has not pointed specifically to what in Woodhead et al. constitutes a “phase detector” is that a phase detector has no meaning with regard to Woodhead et al.

Woodhead et al. is directed to a single wave, and phase difference has no meaning in a single wave train such as that taught by Woodhead et al. Phase shift is certainly not “a phase difference between the square wave voltage provided by the oscillator and the transmission line” as the Examiner states. Phase only has meaning when comparing *two wave trains of equal frequency*, which Woodhead et al. does not disclose. Phase differences are usually expressed as an angle. For example, a phase difference of 0 degrees means that two waves coincide, while a phase difference of 180 degrees means that when one wave goes up, the other goes down. If the Examiner

believes there are two wave trains of equal frequency disclosed by Woodhead et al., and that Woodhead et al. discloses detecting a phase difference between the two wave trains of equal frequency, the Examiner must specifically show exactly *where* Woodhead et al. discloses them, because such teachings are certainly not found in “columns 2-5.”

Applicant respectfully suggests that the Examiner reconsider the Office Action based upon a misunderstanding or misapplication of basic wave theory. Woodhead et al. cannot possibly detect phase shifts when there is only one wave. A single wave cannot be out of phase with itself. Applicant believes the Examiner has mistakenly assumed that the “line delay” referred to by Woodhead et al. has something to do with phase. The “line delay” discussed by Woodhead et al. is the time for the output of the line receiver to propagate down the transmission line. Perhaps the use of the term “delay” instituted the confusion by the Examiner, but “phase shift” or “phase delay” or “phase difference” as discussed in the present application and as the terms are understood by those of ordinary skill in the art have no meaning in reference to a single wave form. As an aid to the Examiner, Applicant again includes the following diagram below illustrating two sinusoidal waves that are 90 degrees “out of phase” with one another.



As can be readily seen, the *frequencies* of both waves are the same, but there is a *phase difference*. Again, phase is not a time or frequency difference from one point to

another along a single wave train as indicated by the Examiner. Woodhead et al. discloses monitoring frequency of a single wave, but not phase.

The Applicants draw attention to col. 2, ll. 36-38, col. 3, ll. 1-7, and col. 3, ll. 45-49, among other places, that make it abundantly clear that the output of the Woodhead et al. device is frequency (from a single wave), and has no phase detector nor any reason to have a phase detector. (“The output means transmits a measure of the frequency for monitoring of the dielectric constant of the material in which the line is embedded.”). Phase is never detected or suggested by Woodhead et al., and the Examiner has failed to point to any portion of Woodhead et al. stating otherwise.

Although the Examiner has erroneously alleged that Woodhead et al. somehow detects phase from a single wave, the Examiner notes that Woodhead et al. does not disclose “a semiconductor circuit indicative of a logical exclusive OR function.” However, the Examiner states that Okulov discloses a semiconductor circuit being indicative of a logical exclusive OR function. Nevertheless, the Examiner fails to state any supportably reasoning as to why a skilled artisan would apply any teachings of Okulov to Woodhead et al. The Examiner has failed to meet his burden of showing something from Woodhead et al. or Okulov that would motivate the combination. “Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination.” *In re Bond*, 910 F.2d at 834, 15 U.S.P.Q.2d at 1568, *quoting Carella v. Starlight Archery and Pro Line Co.*, 804 F.2d 135, 140, 231 U.S.P.Q. (BNA) 644, 647 (Fed. Cir. 1986) (affirming holding of nonobviousness); *see also, e.g., In re Stencel*, 828 F.2d 751, 755, 4 U.S.P.Q.2d (BNA) 1071, 1073 (Fed. Cir. 1987) (reversing Board holding of obviousness); *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. (BNA) 929, 933

(Fed. Cir. 1987) (reversing district court holding of obviousness). In addition, “an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant’s invention *without also providing evidence* of the motivating force which would impel one skilled in the art to do what the patent applicant has done.” *Ex parte Levengood*, 28 U.S.P.Q.2d 1300, 1301-02 (B.P.A.I. 1993) (emphasis added). The Examiner has not articulated any “suggestion or incentive supporting the combination” *from the cited references*, nor has the examiner provided any *evidence* of a motivational force that would impel a skilled artisan to combine the exclusive OR function of Okulov with Woodhead et al.

Moreover, Okulov is *non-analogous art* and may not be permissibly combined with Woodhead et al. in the first place. Okulov has no relevance to the present invention. Okulov does not even teach measurement of moisture, it simply takes inputs from moisture sensors and sounds an alarm if moisture levels reported by other devices are incorrect. The exclusive OR circuits do not perform any phase detection function and are therefore not relevant to the limitations of claim 7. There is certainly no teaching, and no motivation whatsoever found in the cited references, to combine Woodhead et al. with Okulov. Nor is there any expectation of success at arriving at the present invention by such a combination. And even if there was a motivation to combine the references or an expectation of success, one does not arrive at the claims of the present invention. There is no phase detector, and there is no exclusive OR used to perform any phase detection functions. The references must teach *all* of the claim limitations, and even in combination with Okulov, Woodhead et al. do not disclose, among other things, the phase detector or the exclusive OR function to perform phase detection functions. The Examiner states that the Okulov circuit could be added to the

Woodhead sensor to output a signal indicating the states of the sensor, yet even if one was to do so, one does not arrive at the claimed invention. The exclusive logical OR as claimed does not report a sensor state as taught by Okulov.

Claims 11, 12, 14, and 16-18 are dependent from claim 7 and are likewise clearly distinguished from Woodhead et al. in view of Okulov. Nevertheless, with regard to claim 11, the Examiner states that “Woodhead et al. disclose where a time domain reflectometry waveform is used to measure phase difference (Column 2).” Once again, the Examiner misreports the teachings of Woodhead et al. Woodhead et al. never teaches measurement of phase, as evidenced by the omission of any specific reference to phase measurement or phase detection in the Woodhead et al. reference. Woodhead et al. measures *frequency*, not phase. Applicant respectfully requests that the Examiner specifically cite *where* Woodhead et al. discloses phase measurement or withdraw the rejection.

With regard to claim 12, the Examiner states that “Woodhead et al. disclose where frequency domain waveform is used to measure the phase difference (Columns 2-4).” Again, there is no specific reference to help the Applicant understand the Examiner’s confusion over how phase can be detected from a single wave. Instead, the Examiner provides only an omnibus reference to the entire specification of Woodhead et al, which never even mentions the word “phase” or “shift” or anything indicating a detection of phase.

Accordingly, Applicant respectfully requests that the rejection of claims 7, 11, 12, 14, 17, and 18 under 35 U.S.C. § 103(a) over Woodhead et al. in view of Okulov be withdrawn.

Rejection of Claims 7 and 12 Over Kaufmann in View of Okulov

Claims 7 and 12 are rejected under 35 U.S.C. § 103(a) over Kaufmann in view of Okulov. Applicant traverses the rejection. The Examiner erroneously states that Kaufmann discloses “a transmission line” and “a phase detector.” Again, the Examiner has a fundamental misunderstanding of phase and consequently what a phase detector is. Kaufmann does not even disclose a transmission line, much less a phase detector. The Examiner fails to clearly identify what in Kaufmann constitutes a “transmission line” and what constitutes a “phase detector.” In fact neither is present in Kaufmann, which should end the discussion and remove the rejection. The claims of the present invention are clearly distinguished from Kaufmann.

Furthermore, as discussed above, Okulov has no relevance to claim 7 of the present invention. Okulov is directed to monitoring other sensors. The exclusive OR performs no phase detection functions, nor is Okulov permissibly combined with Kaufmann. The Examiner has not proffered any evidence from the references indicating a motivation to combine Okulov with Kaufmann, and even the combination does not disclose all the elements of claim 7.

With regard to claim 12, Kaufmann does not disclose any features capable of measuring phase difference, and the Examiner’s reference to “(Columns 2-4)” does not shed any light on the Examiner’s reasoning. Kaufmann (AT 403213B) is in a foreign language, and is not arranged in columns, so Applicant has no way of deciphering the Examiner’s citation.

Accordingly, Applicant respectfully requests that the rejection of claims 7 and 12 under 35 U.S.C. § 103(a) over Kaufmann in view of Okulov be withdrawn.

Rejection of Claim 11 Over Kaufmann in View of Okulov and Woodhead et al.

Claim 11 is rejected under 35 U.S.C. § 103(a) over Kaufmann in view of Okulov and further in view of Woodhead et al. Applicant traverses the rejection. Claim 11 is dependent on claim 7, and therefore distinguished over Kaufman in view of Okulov for at least all the reasons articulated above. Moreover, neither Kaufmann nor Woodhead et al. disclose use of TDR to measure *phase difference*. Aside from the fact that Kauffmann and Woodhead et al. measure moisture, they have nothing appreciable in common. The Examiner has failed to articulate a motivation to combine the references, nor an expectation of success in so doing. To be sure, even if the references were permissibly combined, Woodhead et al. does not measure phase difference—by TDR or any other mechanism.

Accordingly, Applicant respectfully requests that the rejection of claim 11 under 35 U.S.C. § 103(a) over Kaufmann in view of Okulov and Woodhead et al. be withdrawn.

Rejection of Claim 16 Over Kaufmann in View of Okulov and Numoto

Claim 16 is rejected under 35 U.S.C. § 103(a) over Kaufmann in view of Okulov and Numoto. The Examiner states that “Kaufmann does not explicitly disclose where the low pass filter has a resistor and a capacitor connected to the output of the semiconductor circuit producing a DC voltage proportional to the phase difference of the signal provided to the first and second inputs. However, Numoto discloses in ‘Portable soil moisture tester’ where the low pass filter has a resistor and a capacitor connected to the output of the semiconductor circuit producing a DC voltage

proportional to the phase difference of the signal provided to the first and second inputs (Columns 5-6).” Applicant respectfully traverses the rejection.

Claim 16 is dependent on claim 7 and therefore distinguished over Kaufman in view of Okulov for at least all the reasons mentioned above. Moreover, neither Kaufmann, Okulov, nor Numoto disclose any measurement of phase, let alone producing a DC voltage proportion to the phase difference. Again, the Examiner fails to cite with any specificity where Numoto teaches “the semiconductor circuit producing a DC voltage proportional to the phase difference.” Further, despite the statement of the Examiner otherwise, in fact Kaufmann does show a low pass filter. The Kaufmann low pass filter does not, however, produce a voltage proportional to phase difference.

In addition, as the Examiner has noted, Numoto is directed to measuring the *resistance* of soil, not the capacitance. A person of ordinary skill in the art would find nothing in Numoto that is relevant to the claimed invention. There are no claims directed to measuring resistance contained in the present application, therefore, it is irrelevant whether or not someone could use Numoto to “provide a reading directly corresponding to the resistance of the soil” as the Examiner has alleged. Claim 16 says nothing about measuring soil resistance.

Accordingly, Applicant respectfully requests that the rejection of claim 16 under 35 U.S.C. § 103(a) over Kaufmann in view of Okulov and Numoto be withdrawn.

Rejection of Claims 7 and 12 Over Rauchwerger in View of Okulov

Claims 7 and 12 are rejected under 35 U.S.C. § 103(a) over Rauchwerger in view of Okulov. The Examiner states that:

Rauchwerger discloses an oscillator to provide a square wave voltage signal and a transmission line having an input and an output and a phase detector detecting a phase difference between the square wave voltage provided by the oscillator and the transmission line and the phase detector providing an output signal indicative of the phase difference caused by changes in moisture content of a medium surrounding the transmission line; a low pass filter and a semiconductor circuit (Figures 1-4). What is not explicitly disclosed by Rauschwerger is a semiconductor circuit being indicative of a logical exclusive OR function of signals applied to the first and second inputs of the circuit.

The Examiner then states that Okulov discloses the limitations missing from Rauchwerger. The Applicants respectfully traverse the rejection.

The Examiner has pointed to Figures 1-4, perhaps showing a circuit, but yet again the Examiner fails to give any indication whatsoever what in Rauchwerger he considers the “transmission line,” the “phase detector,” or even the “output signal indicative of the phase difference.” In fact, Rauchwerger discloses no transmission line, no phase detector, and no output signal indicating phase differences. The Examiner has given the Applicant nothing concrete to respond to. The limitations recited by the Examiner related to claim 7 (and therefore claim 12) are completely missing, and there has been no citation to the reference patents that would give the Applicant basis for understanding what in Rauchwerger the Examiner is referring to. Like the other references cited by the Examiner, Rauchwerger never even mentions phase.

Accordingly, Applicant respectfully requests that the rejection of claims 7 and 12 under 35 U.S.C. § 103(a) over Rauchwerger in view of Okulov be withdrawn.

Rejection of Claim 11 Over Rauchwerger in view of Okulov and Woodhead et al.

Claims 11 (and apparently) 14 are rejected under 35 U.S.C. § 103(a) over Rauchwerger in view of Okulov and Woodhead et al. The Examiner states that “Rauchwerger does not explicitly disclose where a time domain reflectometry waveform is used to measure the phase difference.” This is certainly true, as Rauchwerger never measures or even discusses phase difference. Nevertheless, the Examiner states that “Woodhead et al. discloses where a time domain reflectometry waveform is used to measure phase difference (Column 2).” The Examiner then states that “it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rauchwerger to include where a time domain reflectometry waveform is used to measure phase difference as taught by Woodhead et al.”

The Examiner’s admission that Rauchwerger does not use a time domain reflectometry waveform to measure phase difference is stark contradiction to the rejection of claims 7 and 12 above over Rauchwerger (apparently based on an assertion that Rauchwerger does detect phase somehow). Applicant again asserts that neither Rauchwerger nor Woodhead et al. disclose phase measurement. Moreover, with regard to claim 11, there is no feature in Woodhead et al. that could be added to Rauchwerger (or vice versa) with any expectation of success. There is no motivation to combine the teachings of Rauchwerger and Woodhead et al. In fact Rauchwerger and Woodhead et al. describe two completely different approaches to soil moisture measurement, and one of skill in the art would not combine the two. Yet even if the two references are combined, they do not disclose at least the phase detection claimed by the present invention.

Regarding claim 14, claim 14 is dependent on claim 7 and likewise distinguished over the cited references.

Accordingly, Applicant respectfully requests that the rejection of claims 11 and 14 under 35 U.S.C. § 103(a) over Rauchwerger in view of Okulov and Woodhead et al. be withdrawn.

Rejection of Claim 16 Over Rauchwerger in View of Okulov and Numoto

Claim 16 is rejected under 35 U.S.C. § 103(a) over Rauchwerger in view of Okulov and Numoto. The Examiner states:

Rauchwerger does not explicitly disclose where the low pass filter has a resistor and a capacitor connected to the output of the semiconductor circuit producing a DC voltage proportional to the phase difference of the signal provided to the first and second inputs. However, Numoto discloses where the low pass filter has a resistor and a capacitor connected to the output of the semiconductor circuit producing a DC voltage proportional to the phase difference of the signal provided to the first and second inputs (Columns 5-6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Rauchwerger to include where the low pass filter has a resistor and a capacitor connected to the output of the semiconductor circuit producing a DC voltage proportional to the phase difference of the signal provided to the first and second inputs as taught by Numoto.

Applicant respectfully traverses the rejection.

Claim 16 is dependent on claim 7, and therefore distinguished over Rauchwerger in view of Okulov for at least all the reasons mentioned above. Moreover, neither Rauchwerger, Okulov, nor Numoto disclose any measurement of phase, let alone producing a DC voltage proportion to the phase difference. There is no citation with any specificity indicating *where* Numoto teaches “the semiconductor circuit producing a

DC voltage *proportional to the phase difference*.” Low pass filters are nothing new and the Applicant does not claim to have invented them. Whether or not Numoto discloses a low pass filter is irrelevant to the claim. Numoto is directed to measuring the *resistance* of soil, not the capacitance, and does not measure phase at all as recited in the claims.

Accordingly, Applicant respectfully requests that the rejection of claim 16 under 35 U.S.C. § 103(a) over Rauchwerger in view of Okulov and Numoto be withdrawn.

Reinstated Claims

Claims 19-25 are reinstated claims 2-6 and 9-10. Each of the reinstated claims includes one or more of the same limitations mentioned above that is not disclosed by the prior art. Namely, each of the reinstated claims is directed to phase detection, which Applicant has repeatedly asserted is not shown or suggested by any of the prior art of record. The Office has not correctly cited any reference disclosing a phase detector, because in fact none of the cited references disclose a phase detector. Applicant previously cancelled the reinstated claims as compromise with the Office in an effort to move prosecution forward, relying on the previous indication from the Office that claim 7 was allowable. However, claims 19-25 were never cancelled to overcome any prior art, and therefore the Applicant has reinstated the claims herein. For at least the reasons stated above, claims 19-25 should be allowable.

Affidavit of Gaylon S. Campbell

Applicant submits herewith the affidavit of Gaylon S. Campbell in accordance with 37 CFR §1.132 in support of the arguments proffered above.

Conclusion

Applicant has made a good-faith effort to resolve all matters with respect to the present application. Applicant believes that the claims are in condition for allowance. If there are any matters yet to be resolved in connection with this application, or if Applicant can be of any assistance in clearing up the Examiner's misunderstandings, particularly as they relate to the meaning "phase" to those of skill in the art, Applicant requests the Examiner to telephone the undersigned attorney to expedite the handling of this matter.

Respectfully submitted,

Date: 28 April 2004



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